than the adiabatic for dry air. The air removed by drainage is replaced by air from above, which flows down the mountain valleys like a river, often with a tumultuous rush. In this descending current, which is the true Föhn, the temperature gradient is that of the dry adiabatic. The onset of Föhn at a given station occurs when the upper level of the cold air sinks to the level of the station.

In their early stages all Föhns are fed by air which has travelled horizontally to the mountain ridges, and then descended on the northern side. There is no evidence of ascent of air on the southern side of the range during this first, or "anticyclonic," stage. If Föhn persists, a condition of things often develops in which there is heavy rain, and a marked absence of diurnal range of temperature on the south side of the Alps, and simultaneously the temperatures are much lower to the south than to the north of the range. We have then unmistakable evidence of the ascent of air on the south and of its subsequent descent on the north of the range. The conditions which determine whether an "anticyclonic" Föhn shall develop into this second or "stationary" stage need further investigation.

R. G. K. L.

RESPIRATION AT HIGH ALTITUDES.[1]

PROF R. F. FUCHS, with Dr. Deimler, has confirmed the statement of Zuntz and his co-workers and of Durig, that the oxygen use of the human body during work is greatly increased at altitudes above 3000–4000 metres. While on the Colle d'Olen the O_2 use of Fuchs was only 3 per cent. more than at Erlangen; it was 36 per cent. more on the Capana Regina Margherita.

Fuchs and Deimler lived in the hut on the top of Monte Rosa for some weeks, and proved this point conclusively. This increased use of oxygen explains why most tourists are taken with mountain sickness at altitudes above 3000–4000 metres.

The oxygen needs cannot be supplied by the respiratory and circulatory mechanisms in the face of the falling partial pressure of oxygen, and the high oxygen use. Training and acclimatisation economise the oxygen use, increase the oxygen combining power of the blood, the power of the respiratory and circulating mechanisms.

The respiratory quotient sinks to a very low level, *e.g.* 0·53 after work, while the resting value is only 0·6–0·7 at these high altitudes. To explain this, it is supposed either that glycogen is built out of fat and protein in the body, or that substances are not completely burnt in the body, but are given off as lactic acid in the urine. We know that lactic acid is excreted in the urine after a hard run, when the oxygen used is greater than the supply.

A. Loewy and Franz Müller recently have found that the respiratory quotient is reduced by sea-bathing, *e.g.* from 0·88 at Berlin to 0·73 at the North Sea. The diet was the same. There is some evidence that the protein metabolism is different both in high altitudes and after the sea-bathing, but further work is required to explain the low quotients. Under the special conditions substances, such as proteins and their derivatives, may be oxidised, which share but little in the combustion process of the body. Fuchs suggests that the new building of hæmoglobin may explain partly the high oxygen use and the low respiratory quotient. It is generally agreed that a stay in high altitudes does increase the hæmoglobin of the body.

LEONARD HILL.

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[1] "Physiologische Studien im Hochgebirge: Versuche über den repiratorischen Stoffwechsel im Hochgebirge." By R. F. Fuchs and T. Deimler. Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen. Band 41, 1909.

NOTES.

THE ninth meeting of the International Meteorological Committee will be held in Berlin on Monday next, September 26, and following days. It will be preceded by meetings of the Commission for Terrestrial Magnetism and Atmospheric Electricity, of which General Rykatcheff is president and Dr. A. Schmidt is secretary, and by meetings of the Magnetic Observations Committee of the International Association of Academies. Of other commissions which originated with the International Meteorological Committee, those concerning scientific aëronautics, the correlation of solar and terrestrial changes, a proposed *Système Mondial*, weather telegraphy, and maritime weather signals have held meetings in the past year, and their reports will come up for consideration at Berlin. Among new proposals to be considered is one by Prof. V. Bjerknes, of Christiania, for the organisation and publication of strictly synchronous meteorological hourly observations of the air at the surface and above at a large number of stations, with the view of studying in detail the precise changes that take place. Since the last meeting of the International Meteorological Committee, at Paris in 1907, many changes have taken place in the *personnel* of the committee. Death has removed MM. Lancaster, Pernter, and Eliot, while M. Hepites has resigned his directorship of the Roumanian Meteorological Service, and consequently ceases to be a member of the committee. The new members appointed to fill the vacancies are MM. van Everdingen (Holland), Ryder (Denmark), Trabert (Austria), and G. T. Walker (India). Dr. W. N. Shaw, director of the Meteorological Office, is the president of the committee, and Prof. G. Hellmann, director of the Royal Prussian Meteorological Institute, is the secretary.

MR. R. NEWSTEAD, of the University of Liverpool, who, it will be remembered (see NATURE, June 30, p. 530), was dispatched three months ago to Malta by the Liverpool School of Tropical Medicine to investigate the relation of sand-flies to public health, has now returned. It is understood that in the forthcoming report upon the expedition practical measures for dealing with the various disease-carrying insects in the island will be suggested, Mr. Newstead having brought back a considerable amount of material, not only with reference to sand-flies, but also to other carriers of disease.

THE National Fund Airship, which has just been completed, made its first successful flight at Moisson on September 14. It is a little more than a year ago since Mr. Eric Stuart Bruce, the late honorary secretary of the Aëronautical Society of Great Britain, was asked to visit France to make an exhaustive examination into the various types of dirigibles in connection with the national airship, with the result that the Lebaudy type was selected. This latest Lebaudy airship may certainly be said to be the finest semi-rigid dirigible in the world. It is 337 feet 10 inches long, 39 feet 5½ inches in diameter, and has a gas capacity of 353,165·8 cubic feet. It contains three ballonets. The motive power is derived from two four-cylinder Panhard-Levassor petrol motors of 135 horse-power each. The two propellers are made of wood. Mr. Bruce is now acting as honorary secretary to the test committee of the National Fund Airship.

ATTENTION has from time to time been directed to the flower gardens upon vacant land in the neighbourhood of the Strand. The Selborne Society has been investigating a still more interesting building site in Farringdon Street, scarcely removed from the heart of the city. Although this plot has only been cleared for about two years, no fewer than twenty-eight species of flowering plants and ferns have established themselves upon it. Mosses, liverworts, and others of the more simple plants are also represented. Mr. J. C. Shenstone is preparing a detailed list, which will be published in the October number of the *Selborne Magazine*.

THE council of the Concrete Institute has decided to offer a medal annually for the best paper submitted relating to concrete and its applications.

THE Royal Philosophical Society of Glasgow announces that its Graham medal, awarded for original research in any branch of chemical science, is now open to competition. Particulars as to the award are obtainable from the secretary of the society, 207 Bath Street, Glasgow.

THE Incorporated Institution of Automobile Engineers will hold its opening meeting for the present session on October 12, when the president, Mr. F. W. Lanchester, will deliver an address on "Factors that have Contributed to the Advance of Automobile Engineering, and which Control the Development of the Self-propelled Vehicle."

DR. FREDERICK A. GENTH, jun., a prominent American toxicologist, died on September 1 at Lansdowne, Pennsylvania, at the age of fifty-five. He was a member of several foreign chemical societies, and had held official positions at home in connection with the University of Pennsylvania, the Medico-chirurgical Hospital of Philadelphia, and the State Department of Agriculture.

MR. JOSEPH A. HOLMES, director of the technological branch of the U.S. Geological Survey, has been appointed by President Taft to the directorship of the newly established Bureau of Mines. The functions of the new office will be to investigate and report upon safety appliances, and to inquire into the improvement of the methods of mining in general. Mr. Holmes, who is now in his fifty-first year, was professor of geology and natural history in the University of North Carolina from 1881 to 1891, and State geologist of North Carolina from 1891 to 1904, when he entered the service of the national geological survey. He was chief of the department of mines and metallurgy at the St. Louis Exposition in 1904.

THE death is announced of Prof. William H. Niles, who was professor of geology and geography in the Institute of Technology at Massachusetts from 1871 to 1902, and head of the department of geology at Wellesley College since 1888. Although perhaps best known as a teacher and public lecturer, he was author of papers on glacial phenomena and on the physical geology and geography of Massachusetts. In 1874 he directed attention to natural disturbances which occurred in quarries, whereby anticlinal structures were produced, owing to lateral pressure and the relief caused by the removal of rock. Prof. Niles was president of the Boston Natural History Society from 1892 to 1897. He was born on May 18, 1838, and died on September 13 of this year.

THE death is reported, at the ripe age of eighty-three, of Dr. Charles A. Goessmann, for nearly forty years professor of chemistry at the Massachusetts Agricultural College. A native of Naumburg, he graduated at Göttingen, where he was a favourite student, and afterward the assistant, of Wöhler. A report he had made on the value of sorghum as a source of sugar led to his invitation by a former American fellow-student to become scientific director of a sugar refinery in Philadelphia. After occupying that post from 1857 to 1861, he spent eight years as chemist of the Onondaga salt works, where he made important contributions to the chemistry of brines, meanwhile devoting part of his time to the professorship of chemistry at the Rensselaer Polytechnic Institute at Troy, N.Y. The most valuable part of his life-work was done at the Agricultural College at Amherst, which he made a training ground for agricultural and technical chemists. The State of Massachusetts appointed him also director of its agricultural experiment station and analyst to its board of health. He is credited with having exerted, directly and through his pupils, a powerful influence over the attitude of American agriculturists to scientific education.

WRITING in the *Times* of Friday last, Prof. R. Meldola says that it appears to have been overlooked that Erasmus Darwin, the grandfather of Charles Darwin, besides prophesying the introduction of steam as a motive power, foretold, in the following lines, the advent of aërial navigation :—

"Soon shall thy arm, unconquered steam, afar,
Drag the slow barge and drive the rapid car;
Or on wide waving wings expanded bear
The flying chariot through the streams of air;
Fair crews triumphant leaning from above
Shall wave their fluttering kerchiefs as they move;
Or warrior bands alarm the gaping crowd,
And armies shrink beneath the shadowy cloud."

THE first Universal Races Congress, "to discuss, in the light of modern knowledge and the modern conscience, the general relations subsisting between the peoples of the West and those of the East, between so-called white and so-called coloured peoples, with a view to encouraging between them a fuller understanding, the most friendly feelings, and a heartier cooperation," is to be held, under the presidency of Lord Weardale, in London on July 26–29, 1911. We notice that among the papers to be brought before the congress are the following :—Definition of race, tribe, and nation, by Brajendranath Seal; anthropological view of race, by Prof. v. Luschan; sociological view of race, by Prof. A .Fouillée; the problem of race equality, Mr. G. Spiller; differences in customs and morals and their resistance to rapid change, by Prof. G. Sergi; intellectual standing of different races and their respective opportunities for culture, by Mr. J. Gray; inter-racial marriage, by Dr. J. Deniker.

THE report for the past year of the Madras Government Museum, so long associated with the reports and bulletins issued by Mr. E. Thurston, now appears under the signature of his successor, Mr. J. R. Henderson. The most important addition during the year was the establishment of the marine aquarium, of which a description appeared in these columns (February 3). This is now stocked with fish and other marine forms of life collected on the coast, and forms a most attractive exhibit. Numerous accessions to the numismatic cabinet are recorded, the most important being a Roman *denarius* attributed to Quintus Cassius Longinus (B.C. 60), and a second to the Emperor Augustus. These furnish additional corroboration of the importance of the sea trade between Rome and southern India during this period. The present specimens were unearthed in the Coimbatore district.

THE last issue (vol. v., part v.) of the Archæological Publication of the University of California is devoted to an account of the Chimariko tribe of Indians inhabiting Trinity County, in north California. They first came into contact with the whites early in the last century; but their final destruction began with the sudden eruption of gold miners in the early 'fifties, by whom they were overwhelmed and dispersed. The information now collected was obtained by Mr. R. B. Dixon from a woman, the sole survivor of the tribe, and from a male member of a neighbouring group who was well acquainted with their language and customs. They seem never to have assimilated their culture to that of the neighbouring powerful Huba tribe, and it has been suggested, with some degree of probability, that they were a branch of the Shastan stock, which advanced from the north in a south-westerly direction, and with which they exhibit in their mythology certain resemblances. All the scanty available information about their culture and language has now been adequately collected by Mr. Dixon.

MESSRS. DULAU AND CO., LTD., have published in the series of Drapers' Company Research Memoirs a study of the mortality of the tuberculous in relation to sanatorium treatment, by Mr. W. Palin Elderton and Mr. S. J. Perry. The method adopted is to compare the number of deaths observed amongst the tuberculous with the number that would be expected on the basis of the English life-table (1) for patients of certain sanatoria, (2) for Pollock and Williams's cases, which were observed before the days of sanatorium treatment. The authors show that the mortality of tuberculous patients who are undergoing or have undergone treatment is much heavier than that of the general population, and the mortality even of the apparently cured cases is about twice as heavy. The mortality of sanatorium patients does not show any improvement on that of Williams and Pollock's cases, but comparison is difficult, owing to the way in which the older figures were given. It is precisely this comparison, however, which is of importance. The fact that the mortality of sanatorium patients is greater than that of the general population has no bearing on the real question at issue, for even a perfect cure of tuberculosis could surely not be expected, as an incidental result, to turn a weakling into a strong man, nor to render the mortality of the highly selected population in question the same as that of the population at large.

IN the report of the Warrington Museum for the year ending on June 30 last, attention is directed to the large number of donations received, which included 2436 specimens, as against 1645 in the previous twelvemonth.

IN the September number of the *Selborne Magazine* Mr. E. G. Woodd states that an additional protected area for birds has recently been established by the County Council in east Sussex. The area extends from Eastbourne to Hastings, and inland so far as Lewes, and within these limits such birds and their eggs as specially need protection have been scheduled.

WE have received the report of the Sarawak Museum for 1908–9, in which it is announced that Mr. J. Hewitt has been succeeded as curator by Mr. J. C. Moulton. Collecting expeditions have been made to neighbouring districts, which resulted in the addition of interesting specimens, and a catalogue of the birds in the collection was completed during the period under review.

THE International Commission on Zoological Nomenclature has issued through the Smithsonian Institution (Publication No. 1938) a series of twenty-five opinions in regard to matters of dispute in nomenclature. Among many cases, it will perhaps suffice to mention that the committee are in favour of retaining the generic name Simia for the orang-utan.

THE *Entomologists' Monthly Magazine* for September contains a beautifully coloured plate of nine species of rare British beetles, all of small size. According to the authors—Messrs. Champion and Lloyd—of the accompanying notes, one of the most interesting of these is the species named by Dr. Sharp *Eudectus whitei*, of which the single known example was captured by its describer on the summit of Ben-a-Bhuid, Braemar, in the summer of 1871.

A USEFUL catalogue of Danish zoological literature, compiled by Mr. Svend Dahl, has been published by J. B. Lybecker at Copenhagen under the title of "Bibliotheca Danica, 1876–1906." It comprises 262 pages of text, of which 186 are devoted to a list of authors and their works. The manner in which this list is arranged is, however, difficult to understand, as the names are given neither in alphabetical order nor according to date of birth. A specific and subject index to the various papers and books occupies 68 pages, and the volume concludes with an index of authors.

To vol. xii., part ii., of the Proceedings and Transactions of the Nova Scotian Institute of Science, Prof. G. H. Perkins communicates a fully illustrated memoir on cetacean remains from the superficial deposits of Canada. The main object of the communication is a skeleton in the museum at Halifax, discovered about 1873 on the Jacquet River, New Brunswick, which is identified as that of a narwhal (*Monodon monoceros*). Other skeletons, respectively in the museums of MacGill University, Montreal, and Montpelier, belong to the white whale described by Thompson as *Delphinapterus vermontanus*. Whether this is more than a large race of the existing *D. leucas* the author is doubtful.

THE third number of vol. ii. of the Journal of the College of Agriculture, Imperial University of Tokyo, is devoted to entomological subjects, such as Japanese Arctianæ, Panorpidæ, and Mantispidæ, mainly of interest to specialists. Mr. R. Inoue communicates, however, a paper on experiments with silkworms, in which the quantity of mulberry-leaves consumed by the larvæ at different periods of their existence is recorded. Other experiments show that "carbon dioxide, even when pure, has no influence upon the silkworms, and does not act as poison; but when the worms are reared in air containing more than 5 per cent. of the gas they lose their appetite, and their growth is more or less retarded, especially in the earlier stages."

SOME interesting observations on the eyes of trilobites are published by Prof. C. D. Walcott in a paper on Olenellus and other genera of the Mesonacidæ (forming the sixth of a series on Cambrian geology and palæontology), published as No. 6 of vol. liii. of the Smithsonian Miscellaneous Collections. Dr. Lindström expressed the opinion some years ago that all Cambrian trilobites were blind, as he was unable to detect eyes on the upper surface of the cephalon. Such eyes have, however, been detected in one of the American forms by the author, and show the facetted outer surface. It is also suggested that maculæ may occur on the under surface—hypostoma—of the Mesonacidæ, as these have been detected by Lindström in other types. After quoting Prof. A. Agassiz to the effect that trilobites are frequently found lying on their backs, and that young king-crabs (Limulus) often swim and feed in an inverted position, Prof. Walcott suggests that "in all probability the eyes of the hypostoma were of service when the trilobite was lying on its back on the sand or mud, and it was on this account that they were thus developed. It is highly probable that the adult trilobite crawled about the bottom and did not swim freely in the water to the extent that it would be necessary for it to see the bottom. Its habits must have been very much like those of Limulus when in search of food."

WE have received from Mr. J. Wrench Towse, clerk to the Fishmongers' Company, two notices which give useful summaries of the regulations made by Parliament and by the Fisheries Local Committees relative to the seasons for fishing with respect to salmon, trout and char, crabs and lobsters.

A SCHEME for the cultivation in Dalmatia of the spineless variety of cactus raised by Burbank is advocated with considerable reason by Dr. C. C. Hosseus in *Adria* (August), the object being to supply cattle fodder, of which there is a deficiency. The author points out that the natural conditions are favourable, and indicates how the scheme should be inaugurated.

THE details of a Rhododendron producing double flowers in its wild state are given by Dr. M. Miyoshi in the Journal of the College of Science, Imperial University, Tokyo (vol. xxvii., art. 11). The species *Rhododendron brachycarpum* grows in the mountains of central and northern Japan. The anomalous plants shower a second partial or complete corolla whorl. The author notes that double flowers have also been recorded for *Rhododendron ferrugineum* in the Tyrolese Alps, and for *Rhododendron albiflorum* in North America.

MR. C. J. CHAMBERLAIN continues to provide original information regarding the lesser known cycads, his latest contribution, in the *Botanical Gazette* (December, 1909), being a general description of *Dioon spinulosum,* based upon observations made in southern Mexico, where the plants grow in such profusion as to form almost a forest, and the largest specimens attain a height of 16 metres; this species, therefore, in contrast to the short-stemmed *Dioon edule*, supplies the tallest cycads known, with the exception of *Cycas media.* The leaves of an average specimen are about 20 cm. long, and bear more than a hundred pinnæ on either side. The ovulate cones are the largest known for any gymnosperm, as they may weigh as much as 15 kilos, and measure 50 cm. in length by 27 cm. in diameter. No staminate cones were collected in Mexico, but the author describes a specimen received from the Missouri Botanical Garden.

ONE of the most interesting articles in the Transactions of the Scottish Arboricultural Society (vol. xxiii., part ii.) is a contribution by Sir John Stirling-Maxwell giving early results of trials in Inverness-shire with the Belgian system of tree planting on turfs. Intended primarily for afforestation on moors, but also suitable for rough, grass-covered ground, the system consists in turning over turfs, leaving them to dry and sweeten for some months, and then planting in the centre in a heap of soil enriched with a small proportion of basic slag. The young plants take a year to become established, and then grow on quickly. The author also recommends the Sitka spruce, *Picea sitchensis,* for planting at an elevation of about 1000 feet, in which there is agreement with the conclusions communicated in an article by Mr. H. M. Cadell, who considers that it is superior to larch, Scots pine, and Norway spruce for growing in an exposed situation.

DR. A. WILMORE, in a paper in the *Geological Magazine,* 1910, p. 357, has carefully reviewed what is known of the relations of uralite and other secondary amphiboles to their parent minerals. He accepts the possibility of an interchange of material between permeating liquids and an original pyroxene, and does not regard uralite as necessarily an exact paramorph of a pyroxene.

THE geological section of the Belfast Naturalists' Field Club has issued its report for 1909–10 in the Proceedings of the club, and it is clear that a large amount of educational work results from its meetings and excursions. The interesting volcanic neck at Scawt Hill, and a selected series of Cretaceous exposures, have been studied, and a class has been formed under Dr. Dwerryhouse for petrological work. The section is fortunate in continuing to include several members whose contributions involve sound original research.

WE have received the *Bibliotheca Geographica,* issued by the Berlin Gesellschaft für Erdkunde, for the year 1906. This volume, the fifteenth of the series, has been prepared under the editorship of Dr. Otto Baschin; it contains no important changes in general arrangement, but, like all works of the kind, tends to grow in bulk with the ever-increasing volume of the annual output of geographical literature. One of the most characteristic features is the steady increase in the proportion of publications dealing with geographical principles and methods as distinct from purely regional and descriptive matter.

IN vol. xxiii. of the *Annalen des k.k. Naturhistorischen Hofmuseums* Prof. Friedrich Berwerth describes in full detail the meteoric iron which fell on August 1, 1898, near Quesa (39° N., 0° 40′ W.), in the province of Valencia, Spain, and makes an important contribution to the study of the structure of such bodies. Thanks to the generosity of Kommerzialrat J. Weinberger, the entire mass, with the exception of a small piece weighing 30 grams, which had been previously broken off in Spain for use in the investigation of the character of the meteorite, has been added to the fine collection in the Vienna Museum. A slice weighing 375 grams has been cut from it, and the total weight of the mass is now 10,370 grams, 300 grams being lost in cutting. Thanks to its excellent state of preservation, Prof. Berwerth is able to determine that the wedge-like shape of the iron is due to the large development of an octahedron and an icositetrahedron face, the remaining surfaces being three small octahedron faces. He discusses at some length the nature of the depressions—rhegmaglypts (ῥῆγμα, fracture; γλύφειν, engrave) as he terms them—caused by the fierce heat generated by the meteorite's swift rush through the earth's atmosphere; they must not be confused with the hollows due to weathering which are ordinarily seen in irons. The paper is illustrated by reproductions of several excellent photographs.

THE meteorological chart of the North Atlantic for October, issued by the U.S. Weather Bureau, contains an instructive account of the great tropical storm of October, 1909, known as the Key West Hurricane, accompanied by synoptic charts showing the weather conditions over the North Atlantic from October 10–15. The Weather Bureau records verify the general laws of cyclonic movements in the West Indies, announced by the late Father Viñes, that the storms reach further westward as the season advances; they also show that averages of tracks can be given but little weight in forecasting those of individual hurricanes. Observations indicated that a disturbance was developing in the Caribbean Sea on October 2, but the probable course of the storm could not be determined until October 6. On October 9, during its passage over the western part of that sea, a destructive wave swept from the Gulf of Mexico over the low-lying islands and coast of Yucatan. On October 10 the centre of the disturbance had curved and began to move north and north-east, and on October 11 the barometer at Key West (Florida Channel) fell to 28·50 inches, the lowest ever recorded there, and more than 6 inches of rain fell in 2¼ hours, the damage being estimated at nearly a million dollars. The Weather Bureau duly warned the seaports of the progress of the storm, and thereby effected great saving of life; on the Florida East Coast Railway, for instance, 3000 workmen were withdrawn from dangerous points; and the vice-president of the line writes:—"Positively not a life was lost in the storm. . . . Warning by the Weather Bureau enabled us to fully protect all employés and equipment."

THE Central Weather Bureau at Melbourne has recently issued an average rainfall map and isohyets of New South Wales, the first of a series now in course of preparation which will include all the States. These maps will be of great economic value in connection with corn-growing and the keeping of all kinds of stock, for which a knowledge of the rainfall is of prime importance. The map in question clearly shows that the greatest rainfall occurs on and adjacent to the Pacific coast, where the annual amounts range from 30 inches in the south to 60 and even 70 inches in the north. The isohyets and grades of shading plainly show the decrease of the rainfall to the westward. If a 15-inch rainfall is sufficient to ensure payable wheat-growing, the map shows that it can safely be done practically as far west as long. 146°, and even further in the south; but, generally speaking, over the country further to the westward, embracing an area of some 122,000 square miles, the rainfall does not reach 15 inches, and is under 10 inches over an area of about 45,000 square miles in the extreme west of the colony. Mr. Hunt points out that the most remarkable feature of the map is the comparatively light rainfall in the district extending from Delegate, in the south, to Yass, about 2° to the northward, owing to the condensation of moisture by the ranges of mountains by which it is enclosed.

DR. H. FRITSCHE, emeritus director of the Pekin Observatory, in a recent work ("Die saecularen Aenderungen der Erdmagnetischen Elemente," Riga, 1910) makes an attempt, to which boldness at least must be conceded, to extend our knowledge of terrestrial magnetism to epochs prior to direct observation. He starts with the assumption that during the last several thousand years there have been no outstandingly large changes in the earth's magnetism—a hypothesis for which much may be said in spite of the deductions drawn by Folgheraiter from the magnetism of Etruscan vases—and that such changes as have occurred can be represented by periodic terms. For these periods he assumes 500, 700, and 900 years, but his reasons for this choice of periods are rather obscure. He attacks the problem by taking as his knowns the values he has calculated from observations for the Gaussian coefficients for the epochs 1575, 1675, 1811, and 1892. Regarding the Gaussian coefficients as expressed by periodic terms with unknown coefficients, he determines the coefficients by reference to the four epochs just mentioned. He thus obtains general expressions from which Gaussian constants are derivable for any given epoch, and he makes use of these for the construction of isogonal charts for the epochs 1200, 1300, 1400, and 1500 A.D. Tables are given for the values of the Gaussian constants extending back to 2700 B.C. Dr. Fritsche's work must have entailed an enormous amount of onerous calculation, but it must be regarded as of an exceptionally speculative character.

IN a communication made to the Institution of Electrical Engineers in April last, which appears in the August number of the Journal of the institution, Mr. W. P. Digby directs attention to the advantages to engineers of tests of the electrical conductivity of the water with which they have to deal. He shows how, with a simplified conductivity tube and a form of "megger" with its scale graduated to give conductivity directly, an engineer may detect immediately a change in the nature of the feed-water for a boiler, or the amount of priming, or the development of a leak in the condensers, and may control with much greater certainty water-softening or oil-eliminating plants. It is only by actual work with the apparatus under workshop conditions that its utility in practice can be tested and established, and it seems well worthy of a thorough trial by engineers.

THE *Engineer* for September 9 contains an illustrated article on the new armoured concrete viaduct at Rotterdam. This viaduct measures 1600 m.—very nearly a mile—in length, and was commenced in 1904, and is composed of many normal bays and bridges of various types. Each pier of a normal bay is composed of four columns supporting the four armoured concrete girders which go to make up the arch. The lower faces of these girders are curved or arched, while the upper faces are flat. The concrete used was composed, for the most part, of 450 kilos. of Portland cement to half a cubic metre of river sand and one cubic metre of gravel, the sizes of the stones in which varied between 5 mm. and 30 mm. in diameter. Under test loads, a 20 m. arch was deflected 3·26 mm., or 1/6140 of the span. A 15 m. arch was deflected 1·57 mm., or 1/9550 of the span. Normal bays not resting on abutments were deflected, as an average, 1 mm., or 1/9770 of the span; normal bays resting on abutments were only deflected 0·6125 mm., or 1/12600 of the span.

AN article in *Engineering* for September 9 contains an interesting discussion on the progress of aviation during the past year. The progress on the more practical side has been much more striking than in the records achieved. The number of machines which will actually fly is enormously greater, and they do so with much less uncertainty. The greatest advance has been made in cross-country flight, and this is of the utmost importance. While flight may now be looked upon as a fair certainty when the weather is really calm, such weather is rare, in this country at all events. Hence the greatest interest attaches to the progress of flight in a wind, and in this direction the advance has been considerable. Cross-country flights are now undertaken in quite strong winds. The aëroplane has, in the last year, ceased to be a mechanical curiosity, which could do little save make exhibition flights in exceptional weather over a prepared track, and has become a practical machine for progress across country. We have therefore now got to the stage when the aëroplane must be reckoned with as a machine which is a practical factor in human life, and, if progress is as rapid in the future as in the past, it will very soon be a most serious factor. Even in its present state, a machine which can travel seventy miles an hour, and fly at such a height that hitting it would be extremely difficult, must have its uses in war, and with increase in the lifting power, speed, and radius of action, these uses must very rapidly augment. Its useful capabilities in time of peace are less easy to foresee; but that a machine which can travel in any direction with the speed of an express train is destined to have an important influence on civilised life is obvious.